

Lightweight composite mirrors for telescopes, Phase I

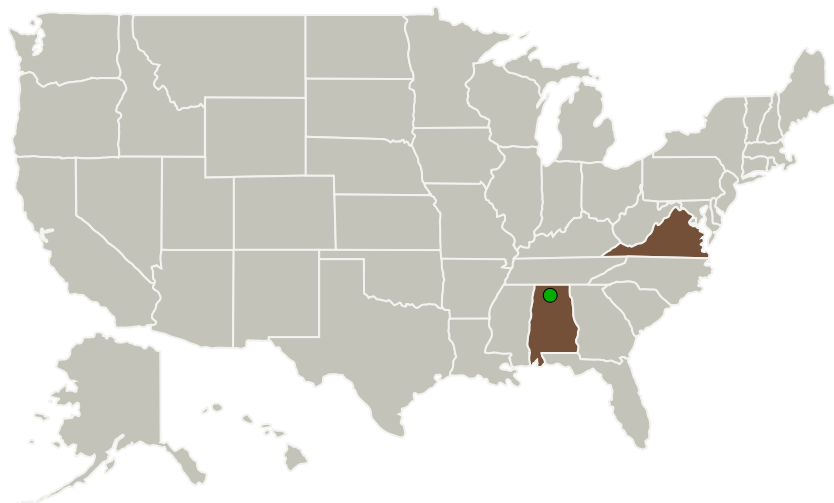
Completed Technology Project (2012 - 2012)



Project Introduction

Lightweight, steady and stiff mirrors are necessary to decrease cost of telescopes such as IXO and GenX used in special NASA missions. Low-density materials are ideal for use as mirrors in such applications. Beryllium has been traditionally considered ideal for lightweight mirrors requiring high rigidity. The toxicity of beryllium poses a major problem. Polished Silicon Carbide (SiC), prepared by Chemical Vapor Deposition (CVD), is the current material of choice for fabrication of mirrors in lightweight telescopes. However, CVD is a complex and expensive technique and the quality of SiC produced is very sensitive to the processing conditions. MMI proposes to utilize a novel displacement reaction to obtain fully dense B4C based composite mirrors with unique microstructural features. Phase I will involve preparing the lightweight optical mirror material and evaluating their mechanical, thermal and optical properties. Phase II will involve optimization of the processing, consolidation and polishing procedures for the composite. In collaboration with industrial partners, who manufacture special purpose optics, mirrors will be fabricated and tested in Phase II for use in various applications.

Primary U.S. Work Locations and Key Partners



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Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	3
Technology Areas	3
Target Destinations	3

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Organizations Performing Work	Role	Type	Location
Materials Modification, Inc.	Lead Organization	Industry Small Disadvantaged Business (SDB)	Fairfax, Virginia
● Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations

Alabama	Virginia
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Project Transitions

**February 2012:** Project Start**August 2012:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/138249>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Materials Modification, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Tirumalai S Sudarshan

Co-Investigator:

Tirumalai Sudarshan

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Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.2 Observatories
 - └ TX08.2.1 Mirror Systems

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System